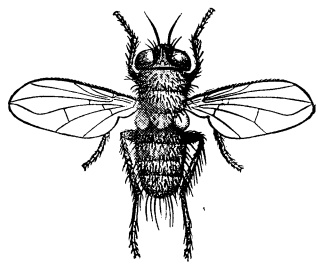
ADDITIONAL NOTES ON THE STRIPED SQUASH BEETLE.

BY HENRY SHIMER, M.D.

DURING the past ten or twelve years I have continued every summer to make observations on the habits of the Striped Squash beetle, or Cucumber beetle (*Diabrothica vittata* Fabr.). Since I discovered and published the account of the breeding place of these insects, in the roots, chiefly, of squash, cucumber, melon and similar plants, I have looked long and closely for some natural enemy of the insect. Almost all insects are liable to be preyed upon by some kind of parasite, which is most efficient in checking their undue multiplication, and far more useful in restraining them than anything that man is capable of doing.

But what insect preys on the Striped Squash beetle it appeared difficult to discover. The young appears quite safe from such enemies, living as it does either on or in the roots of the vines, and, I presume, is almost free from such annoyances. The eggs are deposited on the root at the surface of the ground, or on the root just below the upper loose particles of earth, for although the perfect beetle does not burrow into the compact ground, yet it often is found down along the stem or root, just below the surface, under the loose, dry clots or finer particles of earth which are not pressed closely, or beaten down by rains and hardened in drying, "baked," as farmers say. In this situation the egg, before it is hatched, may be, and doubtless is, sometimes preyed upon by predaceous, ground beetles, but by what insects and to what extent I have no means of knowing from actual observation.

Fig. 60.



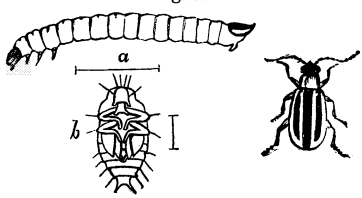
Parasite of the Squash Beetle.

Last May and June we were annoyed by an unusual number of Striped Squash beetles that had developed from the larvæ that entered the ground the previous autumn. As the season was uncommonly dry, we expected, judging from past experience, that

in spite of the best directed preventative efforts, we should have the roots of these vines greatly injured by the larvæ. I looked frequently but found scarcely any larvæ on the roots. The proper time to look for the first young larvæ is when the vine is about beginning to run out over the ground. If the root is and has been free from them, it will be smooth and white, but if affected, its surface, and the surface of the lower part of the stem beneath the ground will appear rough and rust colored. We might speak of all that part of the plant beneath the surface of the ground as root without much impropriety, for in due time it assumes a true root structure, but at this early age the true root is only found below where the seed lies, and above this point it is stem.

I was greatly surprised at finding no larvæ, inasmuch as the perfect insects were swarming among the squash and other vines, now so largely grown as not to require close precautions against the perfect insects, on account of what they might eat themselves. A few of these beetles will soon ruin the plants by their own feeding when the seed leaves alone are developed, but after the third or fourth set of true leaves appear, the growth is so rapid that many beetles may be supplied with food without great damage to the vines. But still at this time the larvæ often do great damage to the plants, and therefore the perfect insects must be kept away if possible (hungry bugs, however, are very hard to manage, and will brave much opposition rather than starve), especially if the plants are scarce, for where the perfect insects abound we usually expect that eggs will be deposited.

Fig. 61.



Striped Squash Beetle, larva and pupa.

But on this particular occasion there was an abundance of vine plants, four or five times as many as were needed for the ground. The prudent gardener who is acquainted with the depredations of these notorious pests, will always plant ten times as many seeds as the plants he needs, so that he will have not only enough for the parent insects that he may not have time or ability to keep away, but also for the larvæ that they will thrust upon his unwilling care. We had then an abundance of good healthy vines, but still it appeared necessary to keep an observing eye upon them lest the larvæ should destroy too many of them, the weather being so dry and

therefore the most favorable for their development. But I could find few or no larvæ, which seemed to me very unusual and remarkable. I searched the ground about the roots long and carefully. I closely and frequently watched for the inexplicable cause of this paucity of larvæ, but all in vain; I could find no enemy about the roots or on the ground that might be destroying the eggs. Thus baffled in my attempts to discover the hidden treasure, I thought of directing my observations to the bodies of the perfect insects themselves. Accordingly, upon dissecting a large, apparently pregnant, female I discovered the secret I so anxiously sought. Instead of a well filled ovary I found a large, dipterous larva filling almost the entire cavity of the abdomen. Others were examined with like results; instead of eggs I found larvæ, one in each female beetle. Some of the larvæ were still small.

On still other beetles I found attached to the surface another species of parasite, drawing its nourishment by penetrating the abdomen. It was apparently some species of mite. I did not find time to study it any further, and have no specimens at command now. I bottled forty or fifty beetles for the purpose of breeding the dipterous larvæ. This was done on the 7th of July, 1870. Twelve days afterwards, that is on the 19th, I was rewarded with five small black flies in my breeding bottle, belonging to the great family *Muscidæ*, genus *Tachina* Fabr., or more correctly according to the later arrangement of flies by Dr. Loew, family Tachinidæ. I sent one of these flies to Dr. Lebaron, state entomologist of Illinois, who locates it in the particular Tachina genus *Melanosphora* Meigen.* The maggot comes out of the body of the fly and forms its brown seed-like pupa on the surface of the ground.

The abdomen of the beetle that has been well eaten out by one of these parasites often appears whitish yellow beneath, instead of black, as do many others.

On the 22d I found other beetles in the field infested with small

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**Tachina* (Melanosphora) *diabroticæ* n. sp. (Fig. 60). Pitch black. Eyes and proboscis light brown. Halteres pale brownish. A crescentric line on each side of the face bordering the eye, almost meeting in the medial line, silvery gray. Anterior portion and sides of the prothorax, in some lights give the same lustrous gray reflections as the face, in others, blackish. Body moderately clothed with stiff black spines. Wings hyaline iridescent, with a smoky yellowish shade towards the base. Expanse of wings, .24 of an inch; width of wing .06 of an inch; length of body .13,—.14,—.15 of an inch. from five dry specimens.

red mites attached to the posterior extremity, not very unlike those often seen about the roots of the wings of grasshoppers, except that these were smaller. These also interfere greatly with the reproduction of the species. I am not aware of any other instance where a perfect Coleopterous insect is so infested with Tachina parasites. A much larger species has been bred from maggots found in the larva of the Colorado potato bug.

ANIMAL LIFE IN THE ROCKY MOUNTAINS OF COLORADO.

BY PROF. W. H. BREWER.

In the summer of 1869, I accompanied the Harvard Mining School Expedition to the Rocky Mountains, under Professor J. D. Whitney, and during the trip, I made some notes that may be worth putting on record, although very imperfect from my ignorance of the specific characters of the animals.

Our explorations were principally in the region about South Park, Colorado, and along the crest extending to beyond the head waters of the Arkansas, and north to Gray's Peak. The altitude of those parts of South Park where we spent most time is from 9,600 to 9,900 feet. I was on the following peaks in fine weather, and on some of them more than once.

Gray's Peak, 14,145 feet; Irwin's Peak, about the same height; Mt. Lincoln, 14,123 feet; Horse Shoe, 13,806 feet; Silverheels, 13,650 feet; Mount Yale, 14,078, besides numerous points over 11,000 feet. (Mt. Harvard, the highest point of the Rocky Mountains, 14,270 feet, was ascended by other members of the party on a very unfavorable day.)

On these peaks, the limit of tree vegetation, as had been already shown by Dr. Parry, is a little over 11,000 feet, and on all the peaks named, there were considerable masses of snow at the time of our visit, which was from the middle of July to the first of September.

In South Park, deer are abundant. Elk were occasionally seen (we saw but three). Mountain sheep are found on the ridges